

Chapter 07

Lecture Outline*

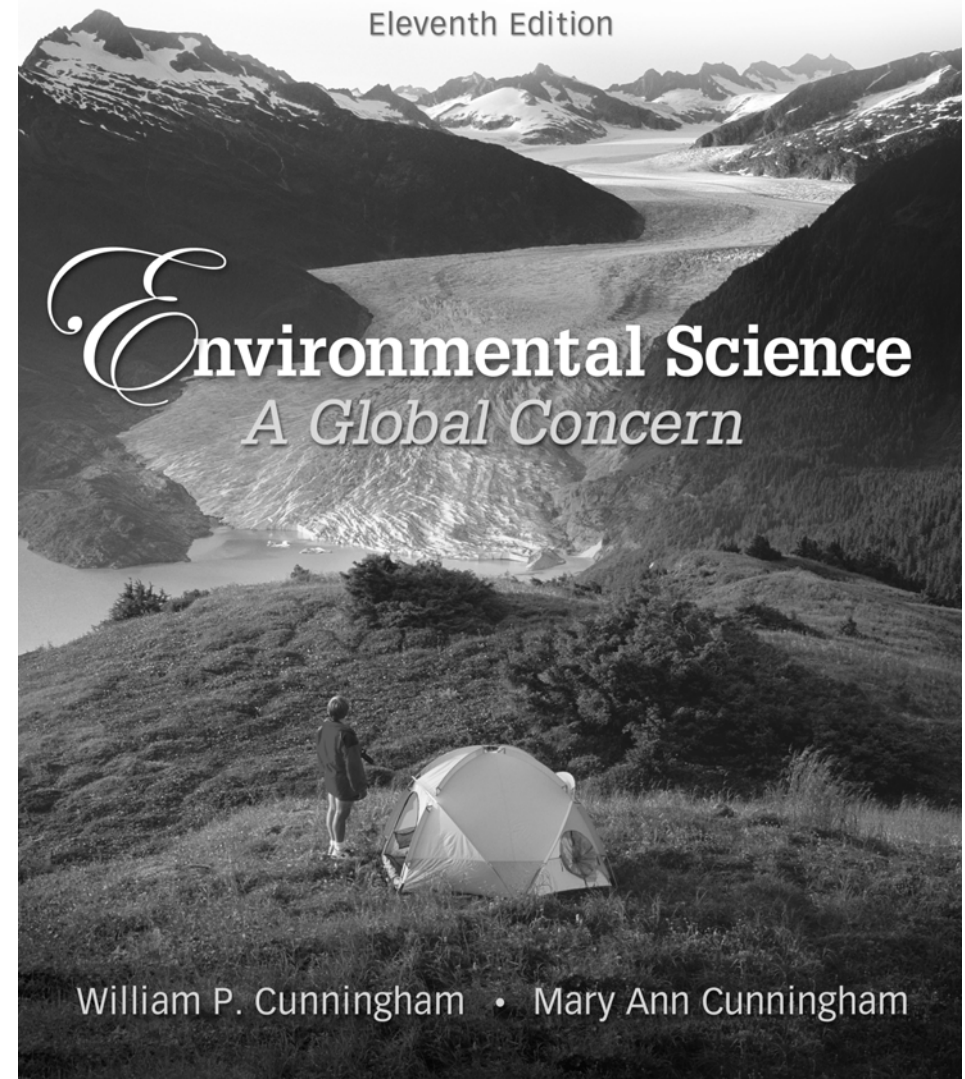
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Human Populations

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Outline

- Population Growth
- Perspectives on Growth
- Factors Determining Growth
 - ❖ Fertility and Mortality
 - ❖ Life Span and Life Expectancy
- Factors Influencing Ideal Family Size
- Demographic Transition
- Family Planning

Population Growth

- Every second 4 or 5 children are born while only 2 people die. There is a net gain of 2.3 persons per second.
- Current world population was 6.8 billion in 2009 and growing at 1.4% per year.
- Global population will double in 61 years if conditions remain unchanged.
- Ecologists are concerned that overpopulation will cause environmental degradation that will threaten the ecological life-support systems on which we depend.

Population Growth

- Economists often disagree with ecologists, arguing that economic and technological growth will enable us to solve these problems.
- Social justice advocates argue that the root cause of the problem is inequitable distribution of the Earth's resources.

Population Growth is Recent Event

- Until the invention of agriculture 10,000 years ago, the human population was a few million people.
- Populations were held in check by diseases, famine and war.
- Early societies regulated their population through cultural taboos, abstinence and infanticide.
- Human population began to increase rapidly after 1600 due to agricultural developments, better sources of power and better hygiene.

Exponential Growth

- It took thousands of years to reach 1 billion people (in 1804).
- It took 150 years to double that to 3 billion (in 1960).
- The most recent billion took only 12 years.
- Another way to look at it, is that the Earth's population tripled in the twentieth century.
- Will we overshoot the carrying capacity?

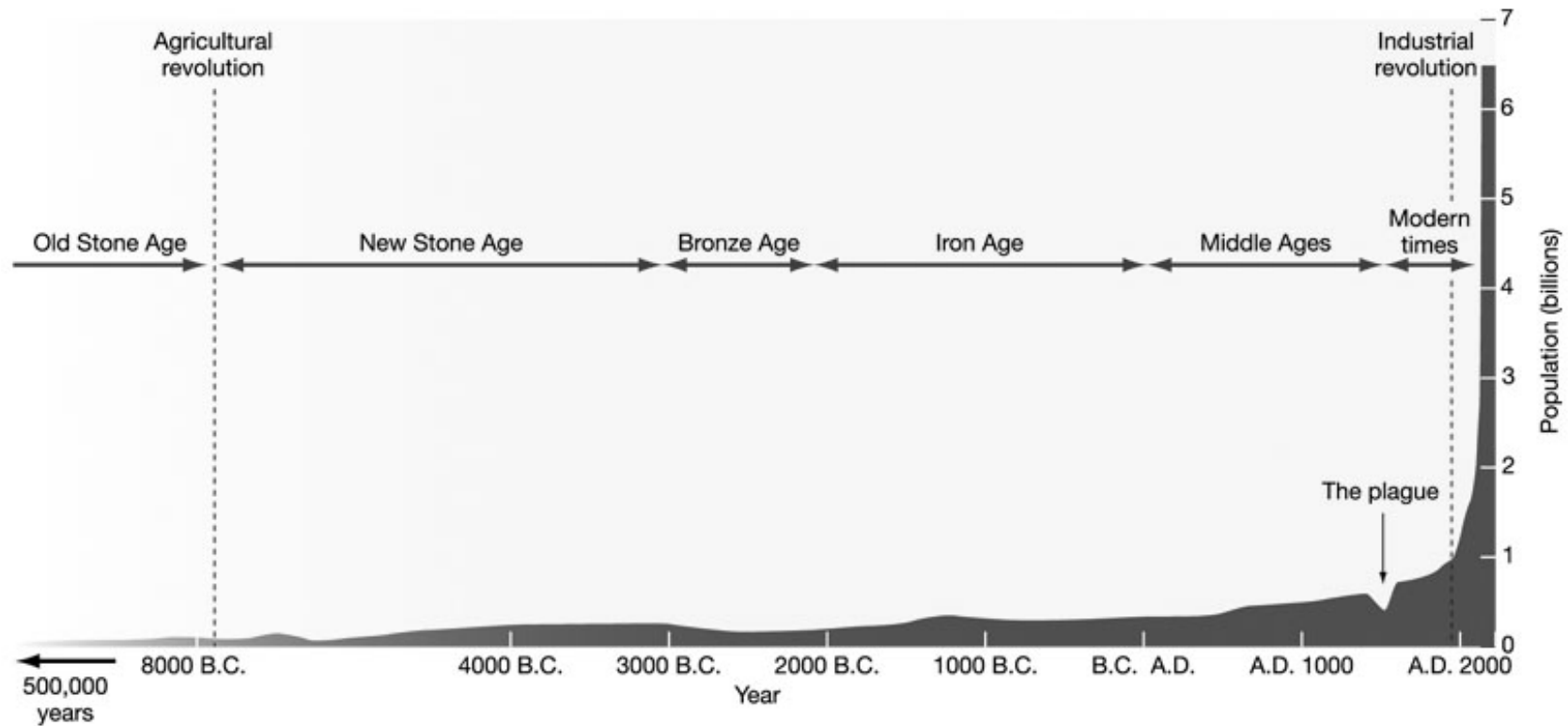
Table 7.1 World Population Growth and Doubling Times

Date	Population	Doubling Time
5000 B.C.	50 million	?
800 B.C.	100 million	4,200 years
200 B.C.	200 million	600 years
A.D. 1200	400 million	1,400 years
A.D. 1700	800 million	500 years
A.D. 1900	1,600 million	200 years
A.D. 1965	3,200 million	65 years
A.D. 2000	6,100 million	51 years
A.D. 2050 (estimate)	8,920 million	215 years

Source: United Nations Population Division.

Human Population Growth

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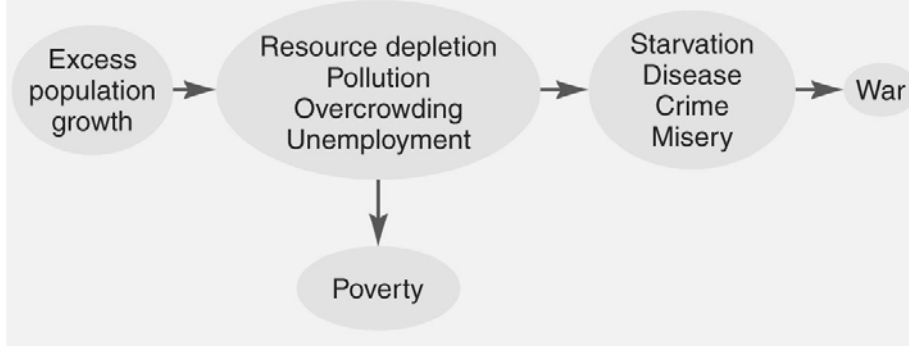
Perspectives on Growth

- Thomas Malthus (1798) wrote *An Essay on the Principle of Population* in which he showed that human populations increase exponentially.
- Population growth is checked by famine, disease, and cultural factors (e.g. late marriage).
- Debate about whether human population growth *causes* environmental degradation (Malthus) or whether human population growth *results from* poverty and resource depletion (Karl Marx).
- These two viewpoints are still debated today.

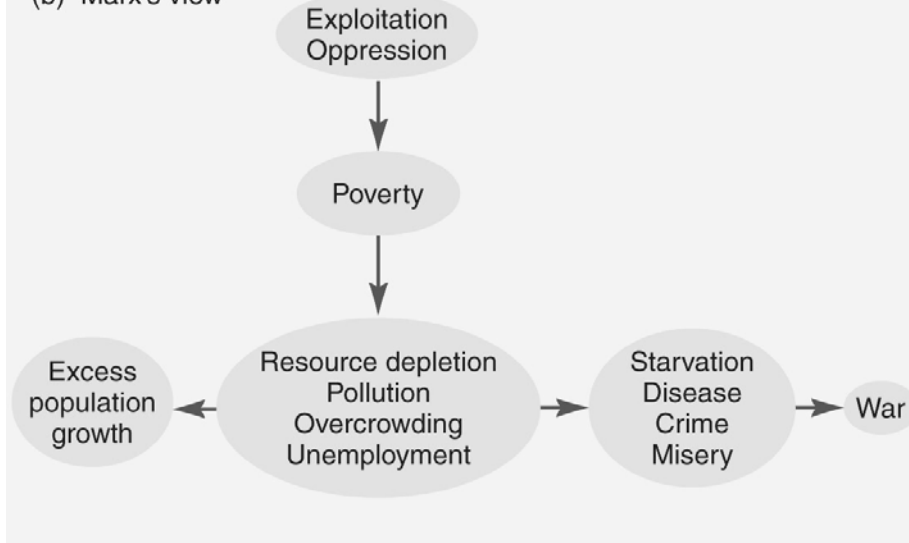
Malthus and Marx

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(a) Malthus' view



(b) Marx's view



Technology Can Increase Carrying Capacity

- Technology can boost carrying capacity as we make progress in agriculture, engineering, commerce and medicine. These achievements make it possible to support many more people per unit area.
- However, much of our growth has been based upon cheap, abundant fossil fuels. Will rising fuel prices constrain food production and distribution?

Environmental Effects of Population

- Effects of population on the environment are not due to numbers alone.

$$I = PAT$$

I = environmental impact

P = population size

A = affluence

T = technology

A single American living an affluent lifestyle produces more pollution than an entire village of farmers in the third world.

Can More People be Beneficial?

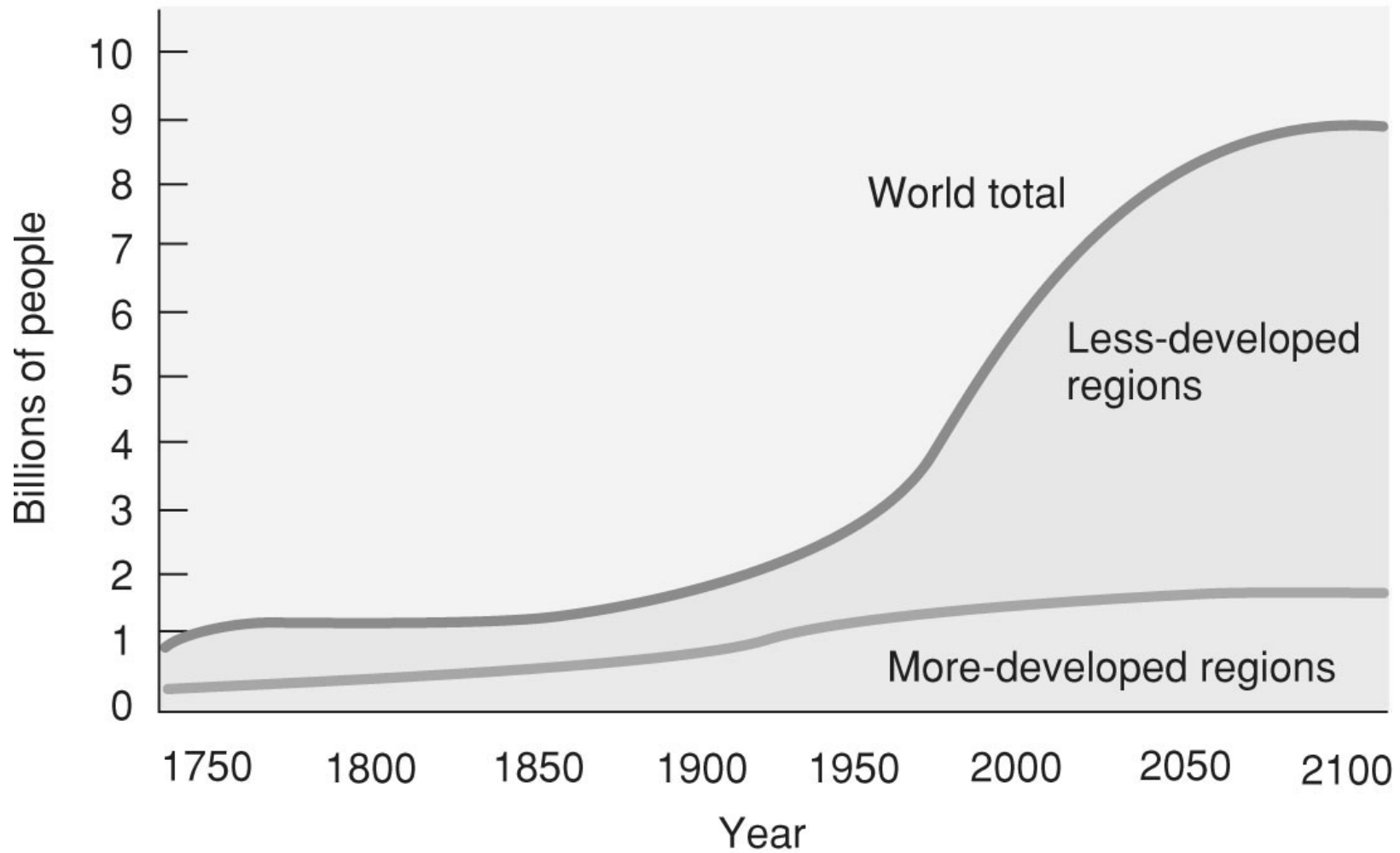
- More people mean larger markets, more workers, and increased efficiency due to mass production.
- Greater numbers also provide more intelligence and enterprise to overcome problems.
 - ❖ Economist Julian Simon believes that human ingenuity will be able to solve the problems associated with population growth.

Factors that Determine Growth

- Demography - encompasses vital statistics about people such as births, deaths, distribution, and population size
 - ❖ The current U.S. Census Bureau estimate for world population is 6.8 billion for 2009.
 - Estimation at best. Many people remain uncounted. Some nations overstate or understate their numbers for political reasons.

Two Demographic Worlds

- First is poor, young, and rapidly growing.
 - ❖ Less-developed countries
 - Africa, Asia, Latin America
 - Contain 80% of world population, and will account for 90% of projected growth
- Second is wealthy, old, and mostly shrinking.
 - ❖ North America, Western Europe, Japan
 - Average age is about 40
 - Populations expected to stabilize or decline



Source: UN Population Division, 2005.

Population of World's Largest Countries

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Table 7.2 The World's Largest Countries			
2009		2050*	
Country	Population (millions)	Country	Population (millions)
China	1,339	India	1,628
India	1,166	China	1,437
United States	307	United States	420
Indonesia	240	Nigeria	299
Brazil	199	Pakistan	295
Pakistan	176	Indonesia	285
Bangladesh	156	Brazil	260
Nigeria	149	Bangladesh	231
Russia	140	Dem. Rep. of Congo	183
Japan	127	Ethiopia	145

*Estimate.

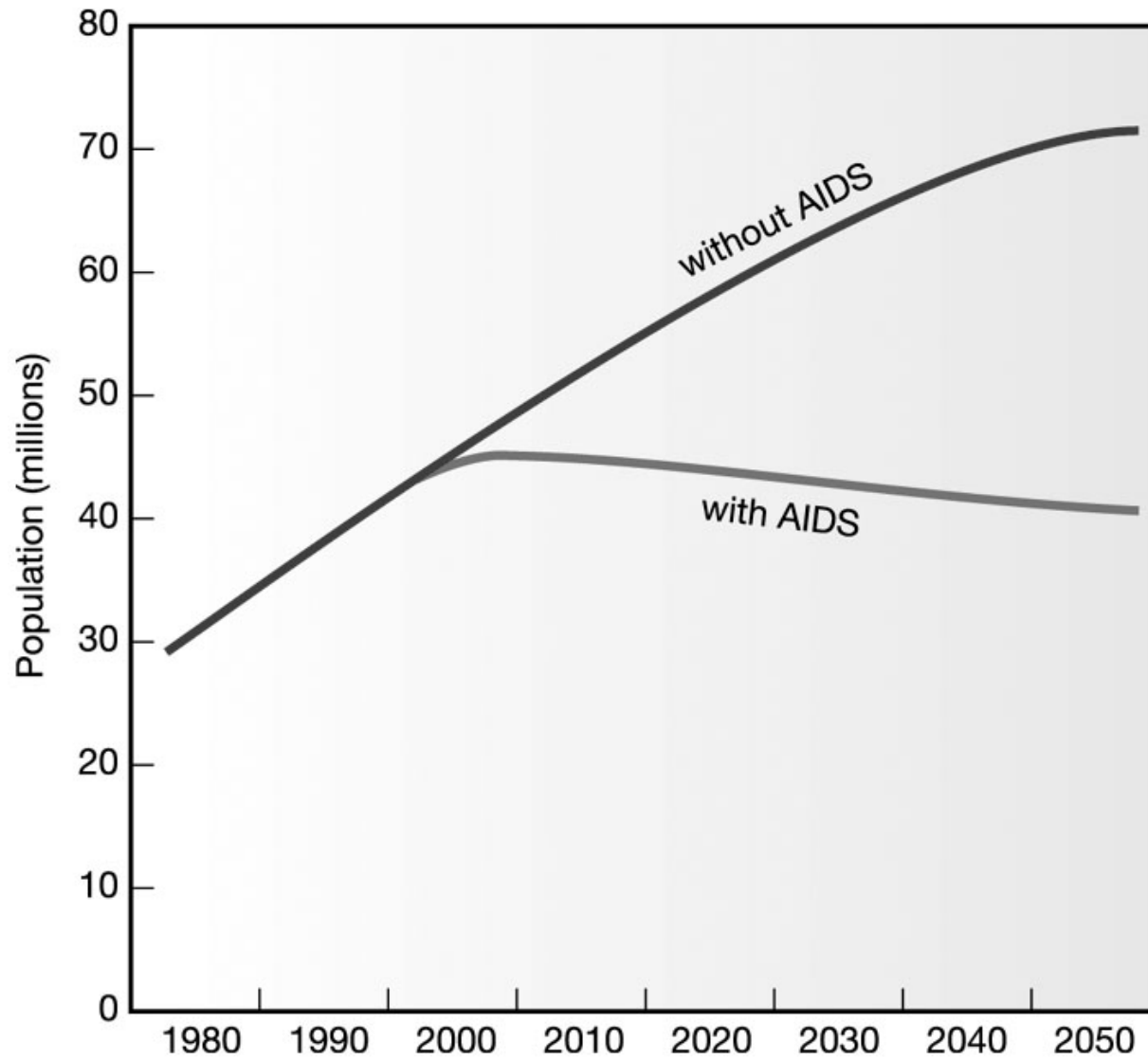
Source: U.S. Census Bureau, 2009.

Declining Populations

- Europe and Japan—birth rates are declining due to couples choosing to have fewer or no children.
- Russia - The end of the Soviet Union caused economic collapse. Death rates have risen dramatically and the birth rate is among the lowest in the world.
- Africa - the AIDS epidemic has hit Africa the hardest. In Zimbabwe, Botswana, Zambia and Namibia, up to 39% of the population is HIV positive. More than 2/3 of the 15 yr. olds now living will die of AIDS. Life expectancy in Botswana has dropped to 31.6 years.

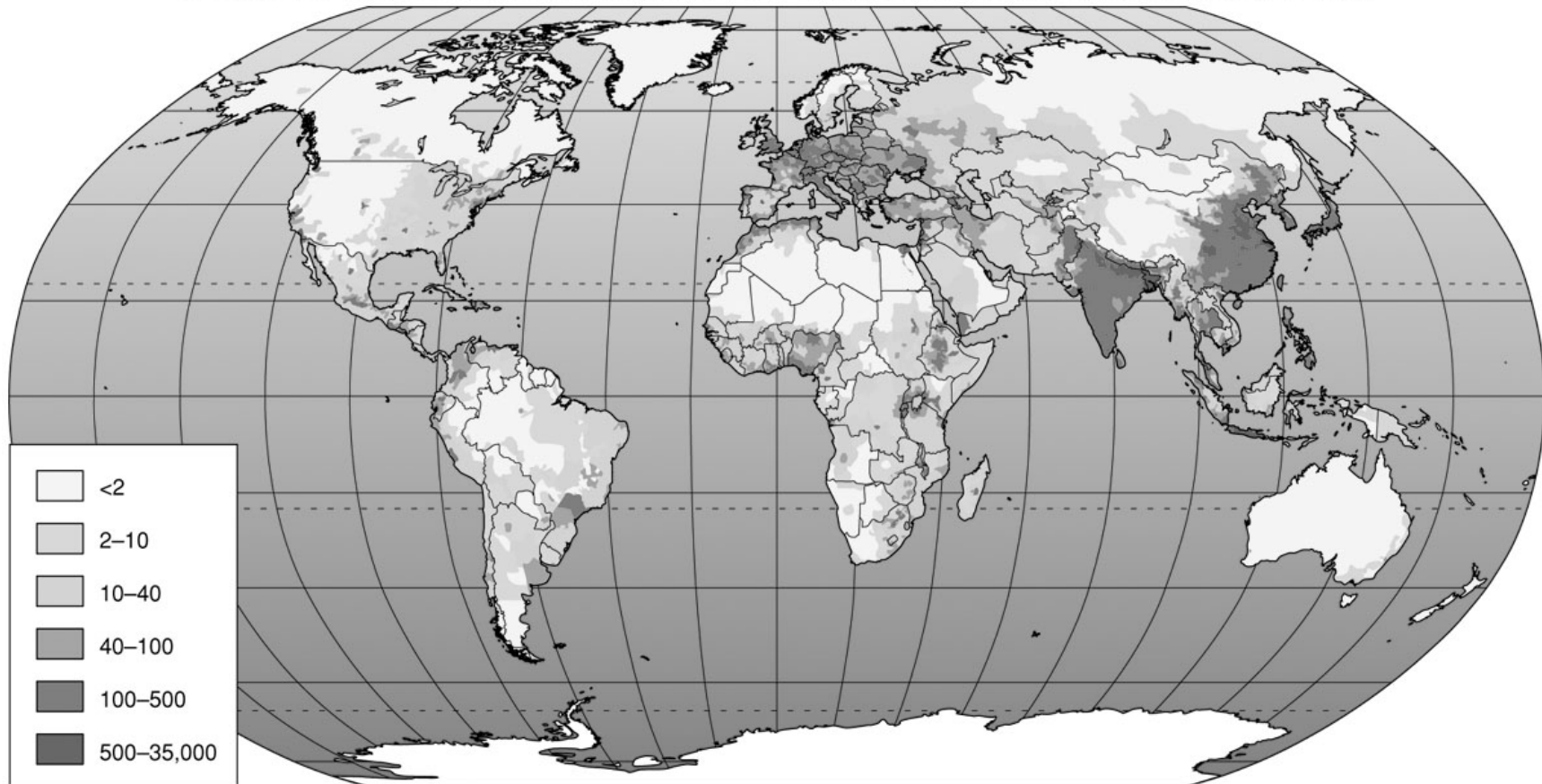
AIDS in South Africa

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Population Density Around the World

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- Population is not distributed equally around the globe.

Fertility and Birth Rates

- Crude Birth Rate - Number of births in a year per thousand. (Not adjusted for population characteristics such as number of women of childbearing age.)
- Total Fertility Rate - number of children born to an average woman in a population during her life
- Zero Population Growth - Occurs when births plus immigration in a population equal deaths plus emigration. ZPG is a rate of 2.1 children per couple, not 2.0, because some people do not have children and some children do not survive to reproductive age.

Decline in Fertility Rates Worldwide

- Fertility rates have declined everywhere *except* Africa.
- Greatest fertility reduction has been in Southeast Asia.
- China's one child policy has decreased the fertility rate from 6 in 1990 to 1.6 in 2009.
 - ❖ Abortion and forced sterilization
 - ❖ Infanticide, particularly of girls
 - ❖ May cause social problems
 - ❖ May result in the gender balance being altered

Mortality and Death Rates

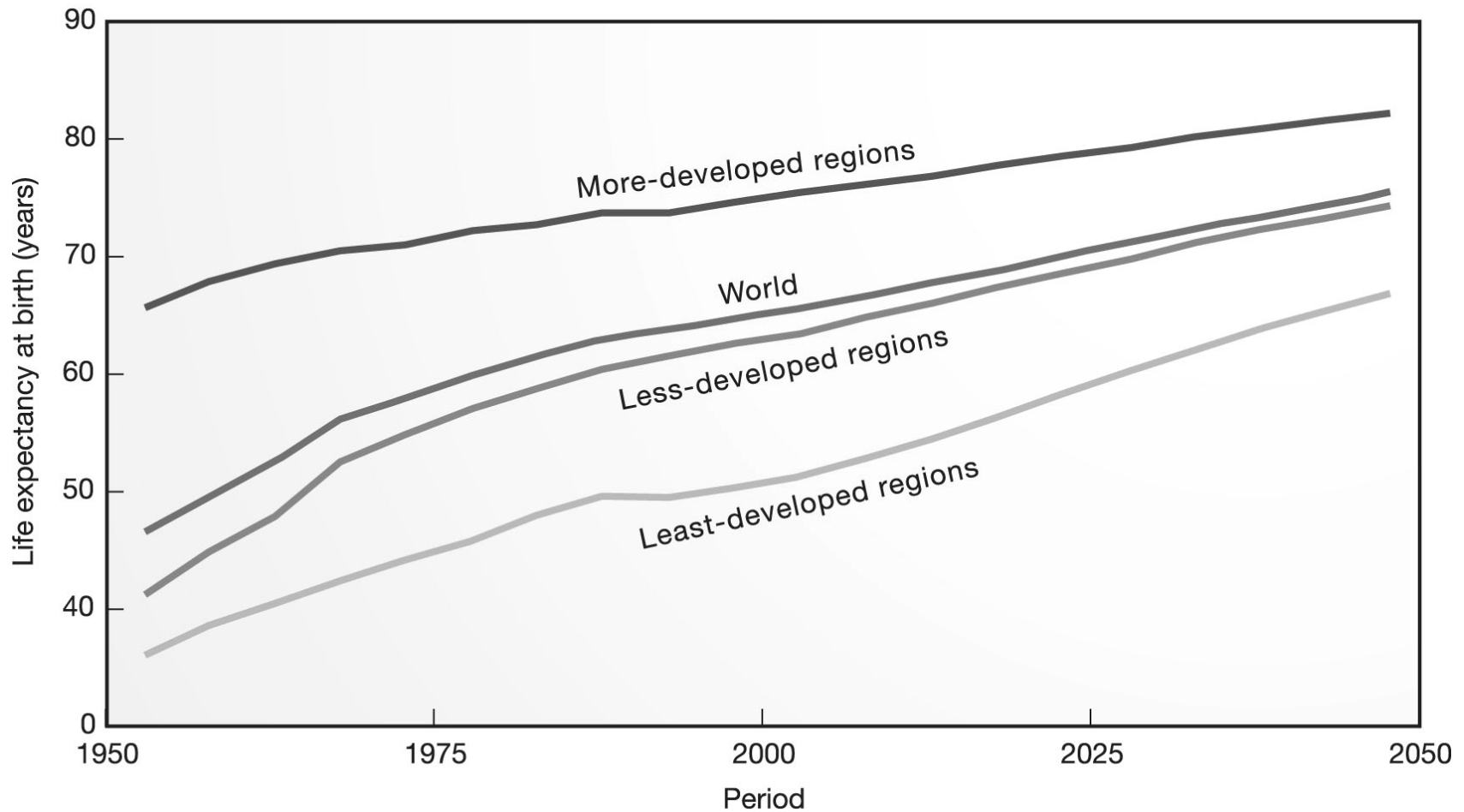
- Crude Death Rate - number of deaths per thousand persons in a given year
 - ❖ Poor countries average about 20 while wealthier countries average about 10.
 - Some rapidly growing countries have very low crude death rates due to a high proportion of young people.
- Natural Increase - crude birth rate minus crude death rate
- Total growth rate includes immigration, emigration, births and deaths.

Life Span and Life Expectancy

- Life Expectancy - average age a newborn can expect to attain in any given society
 - ❖ Declining mortality is the primary cause of most population growth in last 300 years.
 - ❖ Worldwide, the average has risen from 30 to 65 over the past century.
 - Greatest progress has been in developing countries
 - ❖ Longer life expectancy is not due to medicine, but rather improved nutrition, sanitation, and education.

Graph of Life Expectancy At Birth

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Data from the Population Division of the United Nations, 2006

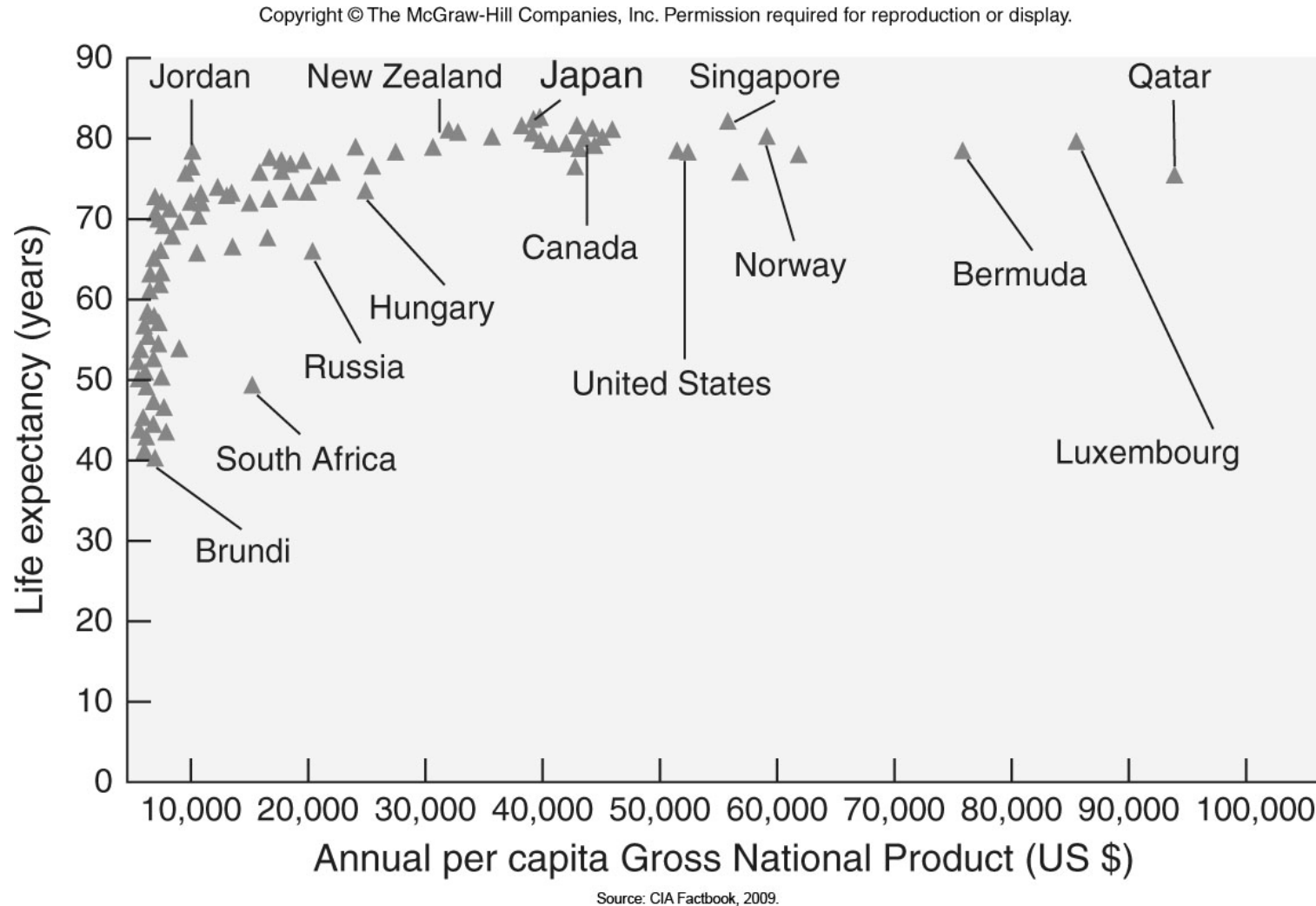
Demographics of Life Expectancy

- There is a great discrepancy between life expectancies in rich versus poor countries.
- Currently, rich countries like Singapore and Japan have the world's longest life expectancies at 81 years.
- In contrast, poor countries in Africa, like Swaziland and Botswana have the world's shortest life spans averaging only about 33 years.
- Discrepancies exist between different socioeconomic groups within the US as well.

Demographic Implications of Living Longer

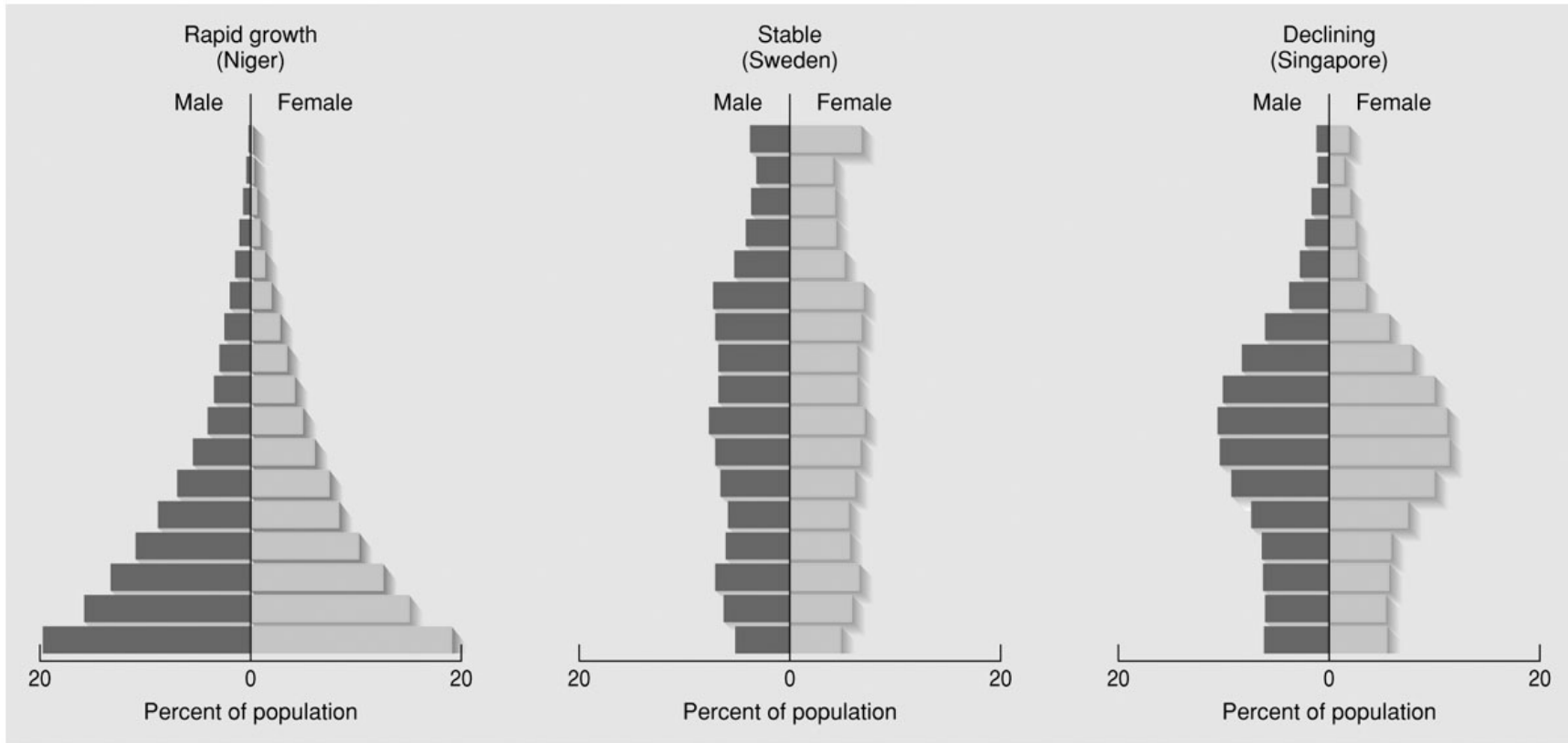
- A population growing rapidly due to natural increase has more young people than does a stationary population.
 - ❖ Even if total fertility rates were to fall, the population would continue growing as young people enter reproductive age (population momentum).
- Some countries now have a stable population with the same number of people in each age group.
- Declining populations have more old people than young people.

Graph of Life Expectancy vs. Income



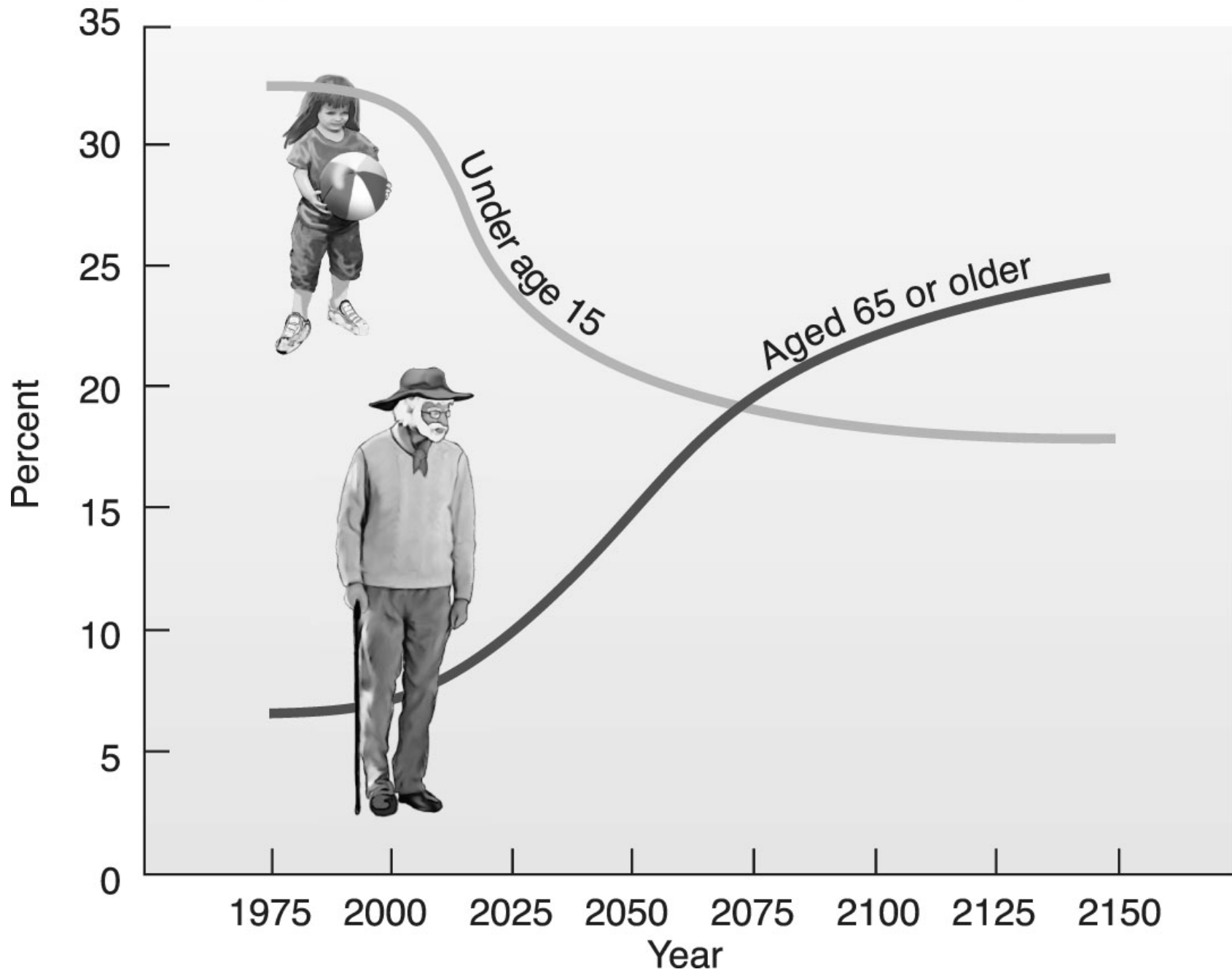
Age Structure

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Living Longer has Implications

- ❖ Both rapidly and slowly growing countries can have a problem with dependency ratio.
 - The number of non-working compared to working individuals in a population.
 - In the U.S., fewer working age people will have to support many more retired people, and this is a problem for the Social Security system.
 - Similar problems are developing in other countries around the world causing countries to rethink their population policies.



Emigration and Immigration

- Emigration and immigration play a large role in human population dynamics.
 - ❖ Developed regions expect 2 million immigrants a year for next 50 years.
 - ❖ Immigration is a controversial issue. “Guest workers” often perform dangerous or disagreeable work, while being paid low wages with few rights.
 - ❖ Locals complain immigrants take away jobs and overload social services.

Ideal Family Size

- Social, cultural and economic factors affect family size.
- Pronatalist Pressures
 - ❖ Factors that increase the desire for children
 - Source of pleasure, pride, comfort
 - Source of support for elderly parents
 - Current source of family income and labor
 - Social status
 - Replace members in society as they die

Pronatalist Pressure Continued

- ❖ Society's need to replace its members may be codified into cultural or religious values.
 - Families with few children are pitied.
 - Controlling fertility may be taboo.
 - In some cultures, boys are valued more than girls because they carry on the family name and often are expected to financially support parents in old age.
 - Couples may have more children than they really want in order to have a boy.
 - Having a large family in some cultures is a source of male pride.

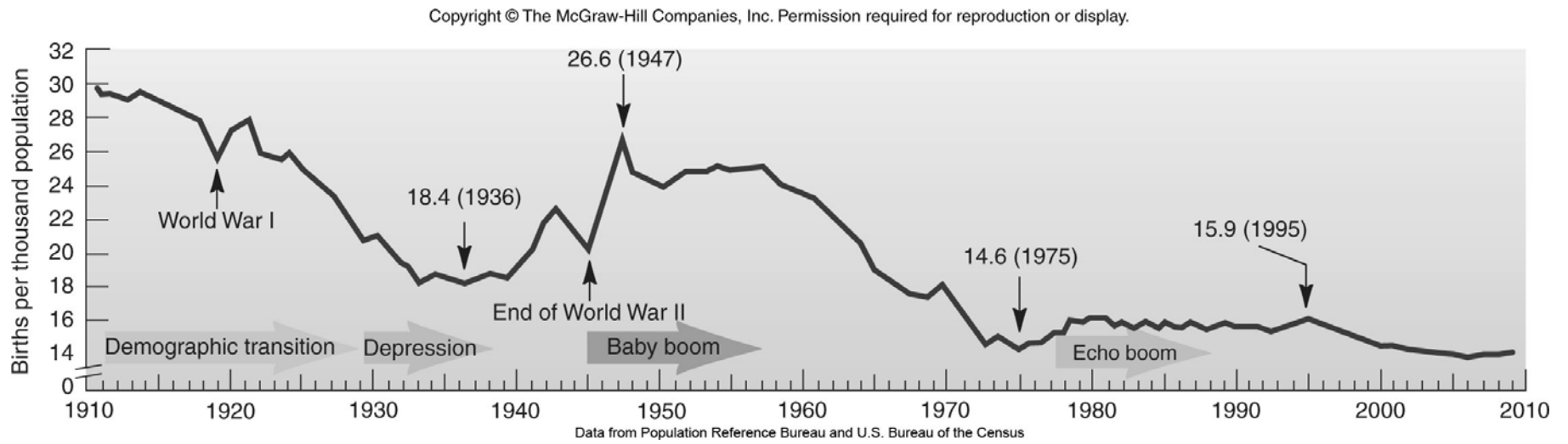
Birth Reduction Pressures

- Higher education and personal freedom for women often result in decisions to limit childbearing.
 - ❖ When women have more opportunities to earn a salary, they are less likely to have many children.
 - ❖ Education and socioeconomic status are usually inversely related to fertility in wealthier countries.

Birth Reduction Pressures

- In developing countries, higher income often means families can afford more children, thus fertility often increases, rather than decreasing as it does in developed countries.
- In less-developed countries, adding another child to a family usually does not cost much, while in developed countries, raising an additional child can carry significant costs.

A Century of US Birth Rates



Could We Have a Birth Dearth?

- Most European countries, as well as Asia, Japan, Singapore and Taiwan, are experiencing negative growth rates.
 - ❖ There are concerns in all these countries about a lack of young people to be soldiers, workers, and taxpayers.
- One reason that birth rates may have dropped in developed countries is that toxins and endocrine disruptors that are pollutants interfere with sperm production. Sperm numbers and quality have fallen by half in the last 50 years.

Demographic Transition

- Pattern of falling death rates and birth rates due to improved living conditions accompanying economic development.
 - ❖ Pre-Modern Society - Poor conditions keep death rates high; birth rates are correspondingly high. (Stage I)
 - ❖ Economic Development brings better standard of living thus death rates fall. Birth rates stay constant or even rise. (Stage II)

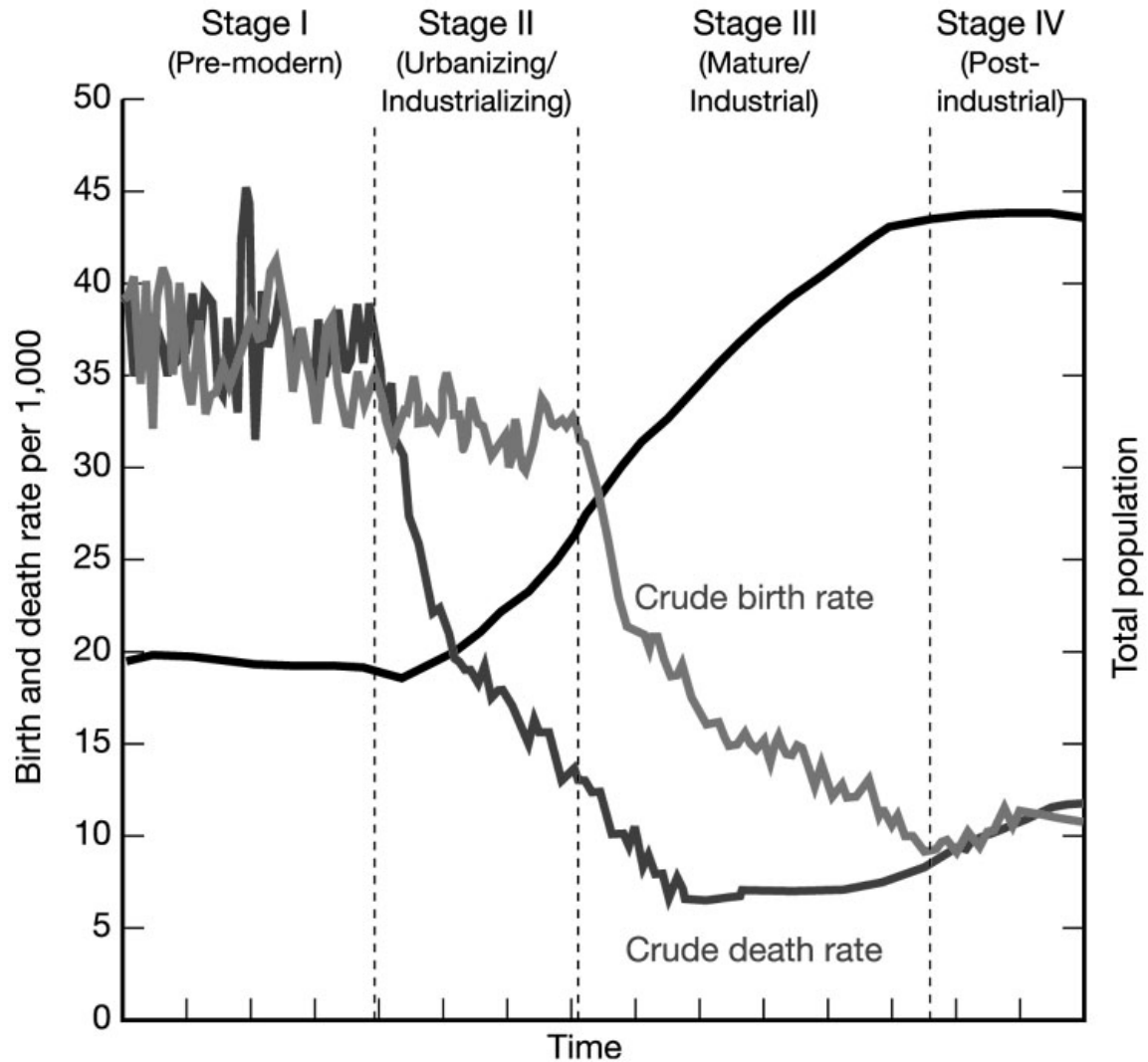
Demographic Transition Continued

- In a mature industrial economy, birth rates begin to fall as people see that most of their children survive. (Stage III)
 - ❖ Populations continue to grow due to population momentum.
- Developed Countries - Transition is complete and both death and birth rates are low and population is in equilibrium. (Stage IV)

Demographic Transition

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The Demographic Transition Model



Demographic Transition Happening Now?

- Four conditions necessary for demographic transition:
 - ❖ improved standard of living
 - ❖ confidence that children will survive
 - ❖ improved status of women
 - ❖ birth control
- Some demographers think that a demographic transition is taking place now in developing nations.

Demographic Transition Now?

- Others take a more pessimistic view. Lester Brown warns that poorer countries may be caught in a demographic trap.
- The population is growing so rapidly that there are not enough resources to complete modernization and enter stage IV.
- People who take this view urge birth control, education, and national policies that limit population growth.

Social Justice

- Still other demographers believe that in order for the demographic transition model to work, resources must be distributed more equitably.
 - ❖ They believe that the world has enough natural resources, but inequitable social and economic systems cause maldistribution.
 - ❖ Many rich countries, when they were colonial powers, extracted the wealth from countries that were their colonies. Some of the world's poorest countries had rich resources and adequate food supplies before they were impoverished by colonialism.

Other Rights

- We should consider the rights of other species.
 - ❖ Perhaps, rather than asking what is the maximum number of people that Earth can hold, we should instead ask what is the optimum number of people at which we can provide a fair and decent life for all humans while causing the minimum impact on other species.

Women's Rights and Fertility

- Education and job opportunities for women reduce fertility rates.
- When child mortality is high, parents tend to have high numbers of children to ensure that at least some survive. Improving child survival would reduce the number of births.
- Land reform, political rights, job opportunities for women, and improved health for women translate into better survival for children and therefore lower fertility.

Family Planning

- Family Planning - allows couples to determine the number and spacing of their children
- Birth Control - any method used to reduce births
 - ❖ Traditional Methods
 - Long breast-feeding (suppresses ovulation), taboos against intercourse while breast-feeding, celibacy, folk medicines, abortion, infanticide

Family Planning

- Current Methods
 - ❖ Avoidance of sex during fertile periods
 - ❖ Mechanical barriers preventing contact between sperm and egg
 - ❖ Surgical prevention of sperm or egg release
 - ❖ Chemical prevention of sperm or egg maturation, release, or implantation
 - ❖ Physical barriers to implantation
 - ❖ Abortion

Birth Control Methods

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Table 7.3 Some Birth Control Methods and Pregnancy Prevention Rates

Method	Number of Women in 100 Who Become Pregnant
Sterilization (male, female)	<1
IUD	<1
Oral contraceptive (the Pill)	1–2
Hormones (implant, patch, injection, etc.)	1–2
Male condom	11
Sponge and spermicide	14–28
Female condom (e.g., cervical cap)	15–23
Diaphragm together with spermicide	17
Abstinence during fertile periods	20
Morning-after-pill (e.g., Preven)	20
Spermicide alone	20–50
Actively seeking pregnancy	85

Source: U.S. Food and Drug Administration, *Birth Control Guide*, 2003 Revision.

Future of Human Populations

- Most demographers believe the world population will stabilize sometime during the next century.
 - ❖ Projections of maximum population size
 - Low - 7 billion by 2050, then fall to 6 billion by 2150
 - Medium - 8.9 billion by 2050 then stabilize
 - High - continue to grow to 25 billion by 2150
- High unmet need for family planning. Women in poorer nations often desire family planning but do not have access to it.

Factors that Complicate Family Planning

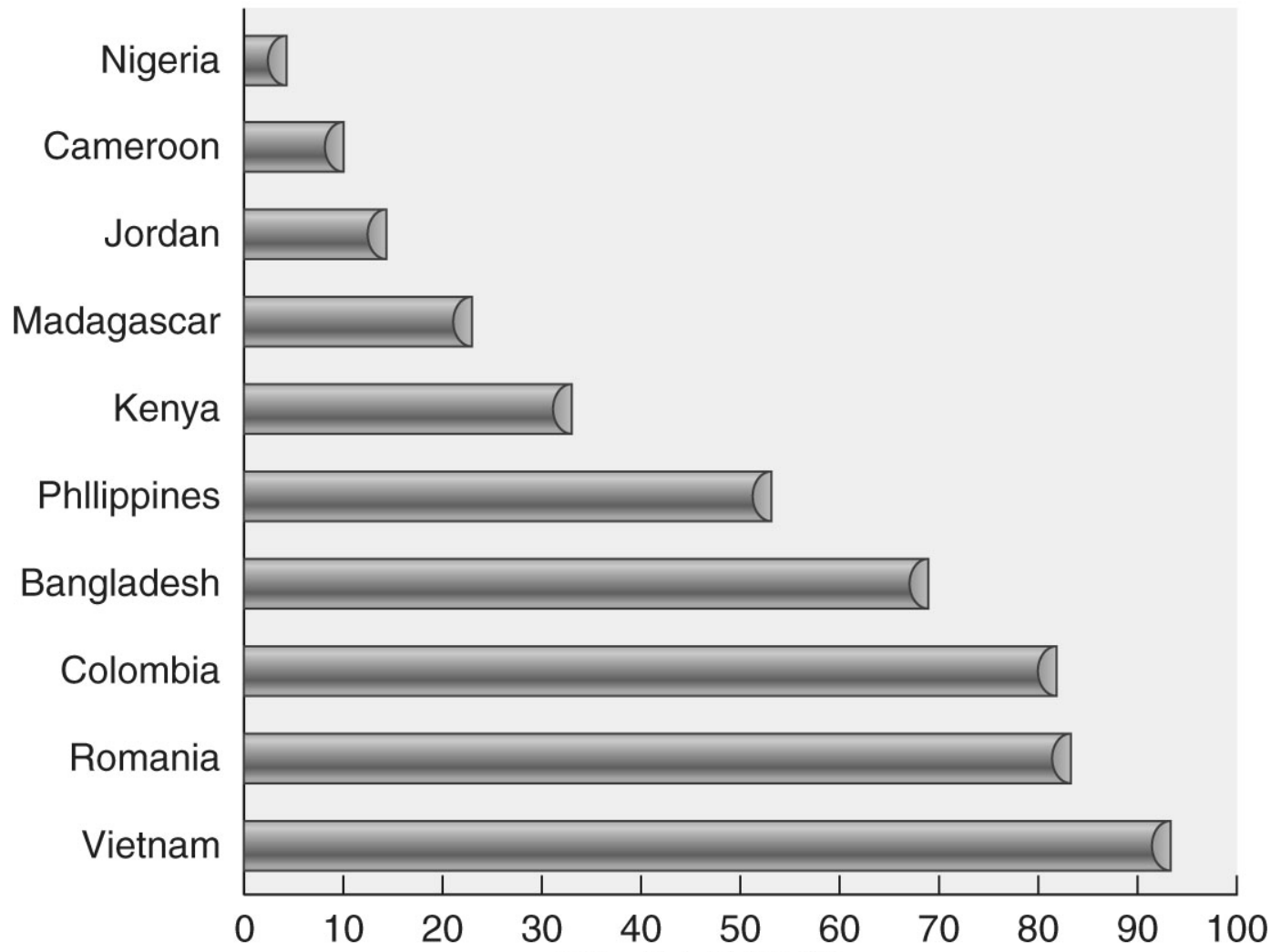
- Politics of Family Planning:
 - ❖ In 1994, under the Clinton Administration, the U.S. played a lead role in the International Conference on Population and Development in which 179 countries endorsed universally available family planning. This agreement stipulated that abortion should never be promoted as family planning.
 - ❖ In 2000, under the G.W. Bush Administration, the U.S. withdrew its financial support for this agreement because of concerns that the ICPD could be interpreted as pro-abortion.

Factors that Complicate Family Planning

- Some religions forbid birth control or encourage couples to have as many children as possible.
- Often, societal changes must first take place before family planning programs will be successful.
 - ❖ Improved education and economic status for women
 - ❖ Improved status for children
 - ❖ Increased sense of social responsibility
 - ❖ Financial and political stability
 - ❖ Effective and acceptable birth control methods

Percentage of Married Reproductive-Age Women Who do not Want a Third Child

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Data Source: U.N. Population Division 2006